Fermilab

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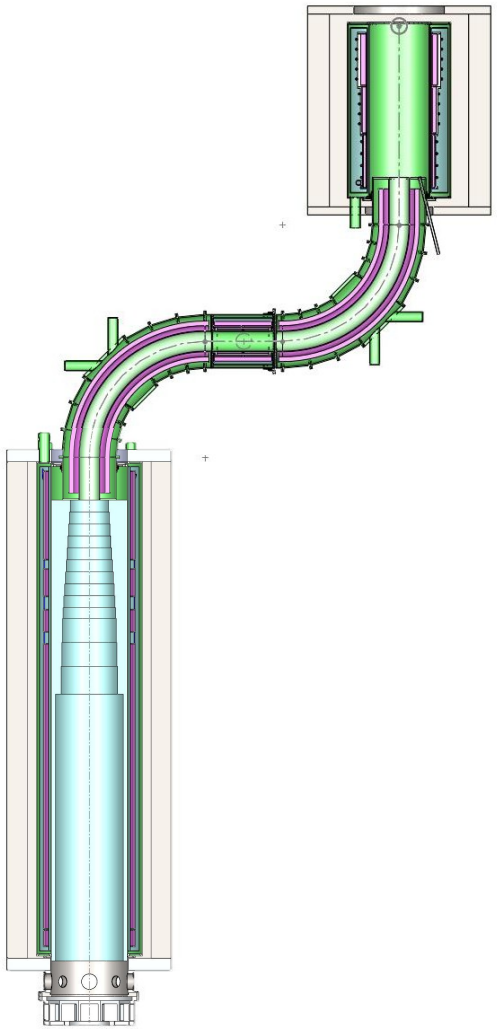
Design of a Magnetic Mapping System for Mu2e

Charles Orozco

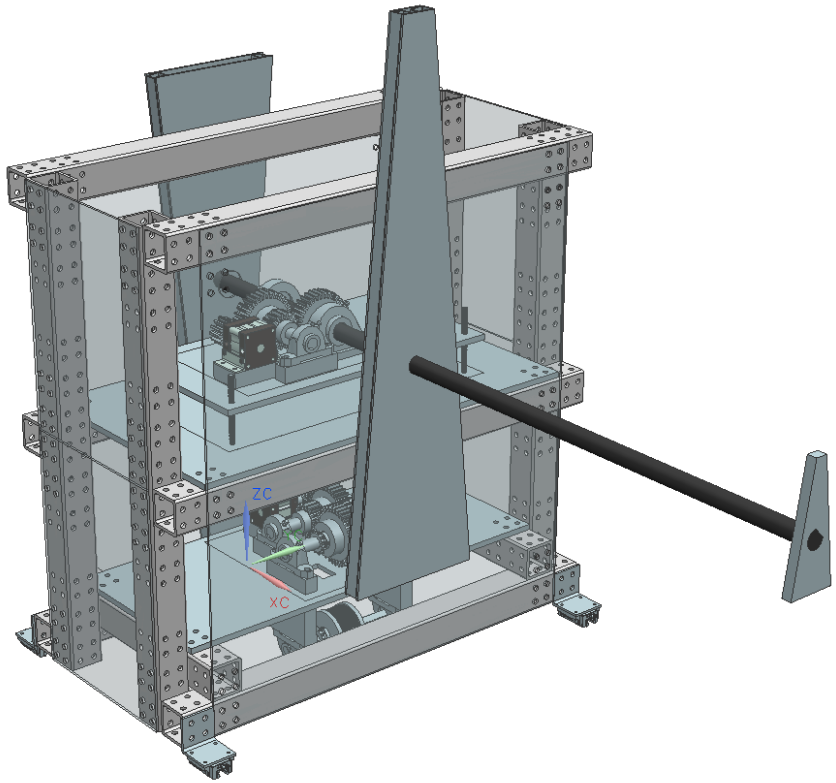
4 August 2014

Introduction – Mu2e and Project Requirements

- Conversion of muons to electrons
- Three Solenoids
  - Production Solenoid
  - Transport Solenoid
  - Detector Solenoid
- An accurate magnetic field map is required
- The DS is 10 meters long
- Magnetic field gradients
- Material Constraints
  - No magnetic materials



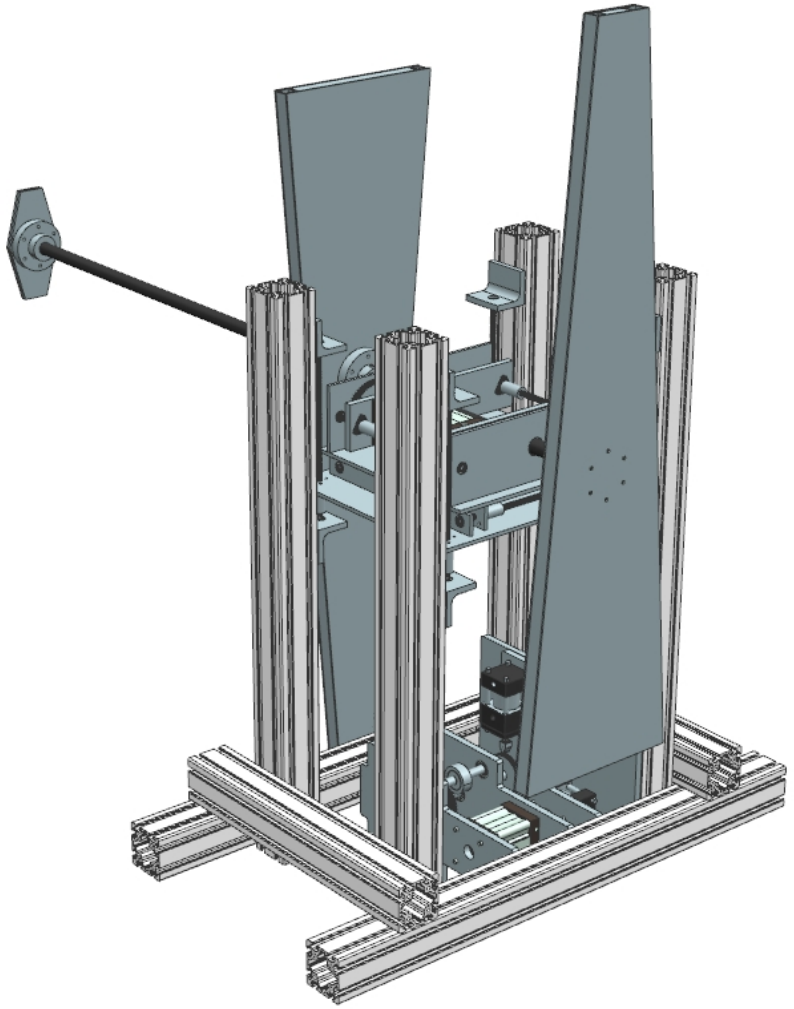
Summer 2013



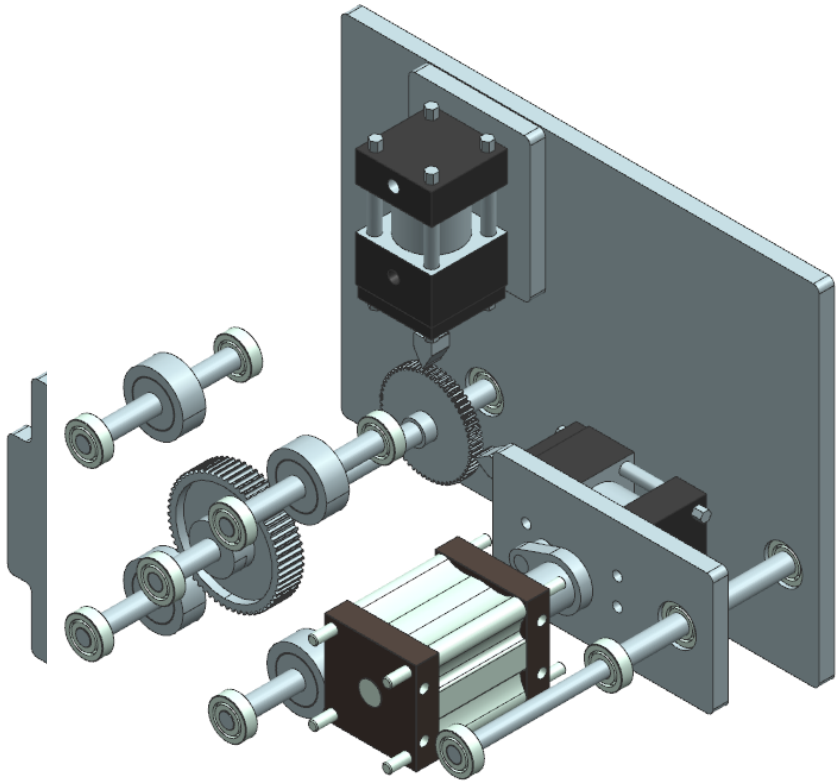
- Preliminary designs for the DS mapping system
  - Z Drive
  - Phi Drive
  - Leveling System

Summer 2014

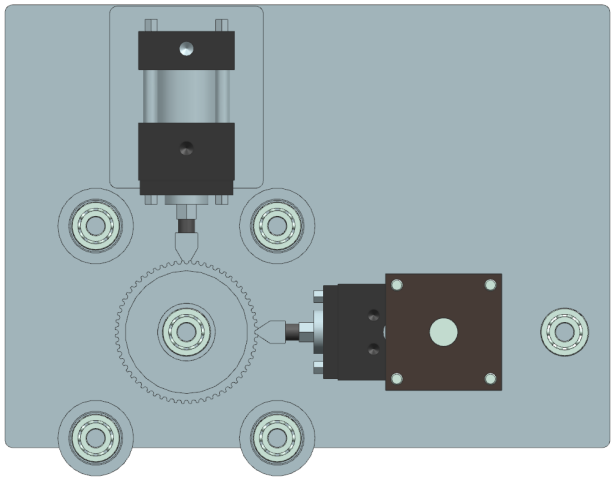
- Major revisions to the preliminary design
- Worked with suppliers to find the necessary parts
- Created a preliminary cost estimate of the system
- Migrating the design files to Teamcenter



Z Drive

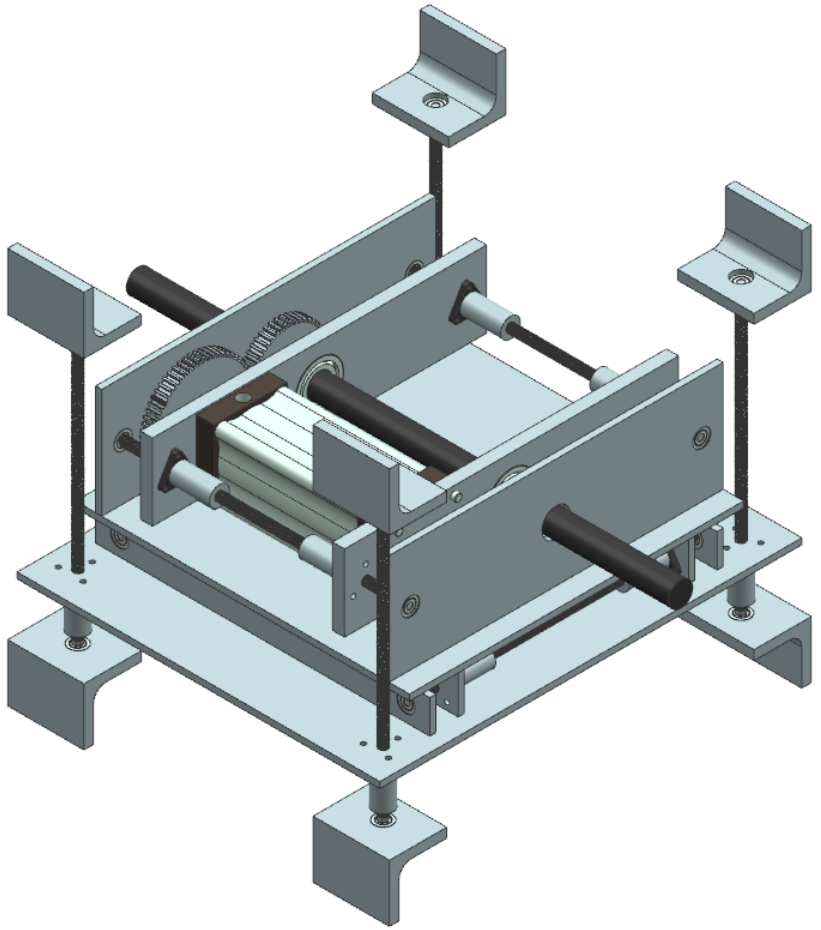


- Air powered stepper motor
- Two linear actuators
- One rotary actuator

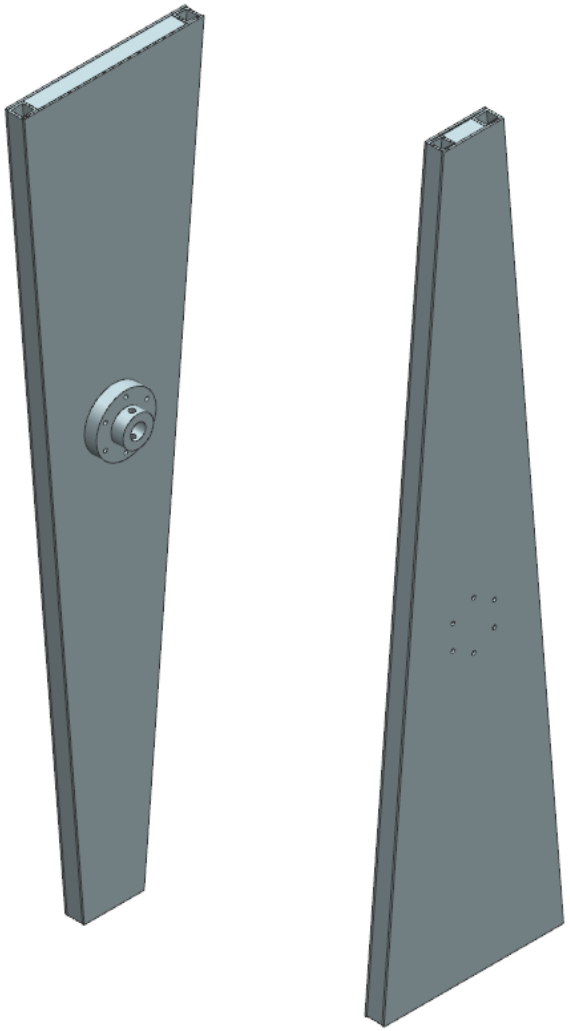


Phi Drive

- Three axis linear adjustments using 1/40” pitch lead screws
- Minute rotational adjustments using the play in the lead screws
- 360°continuous rotation



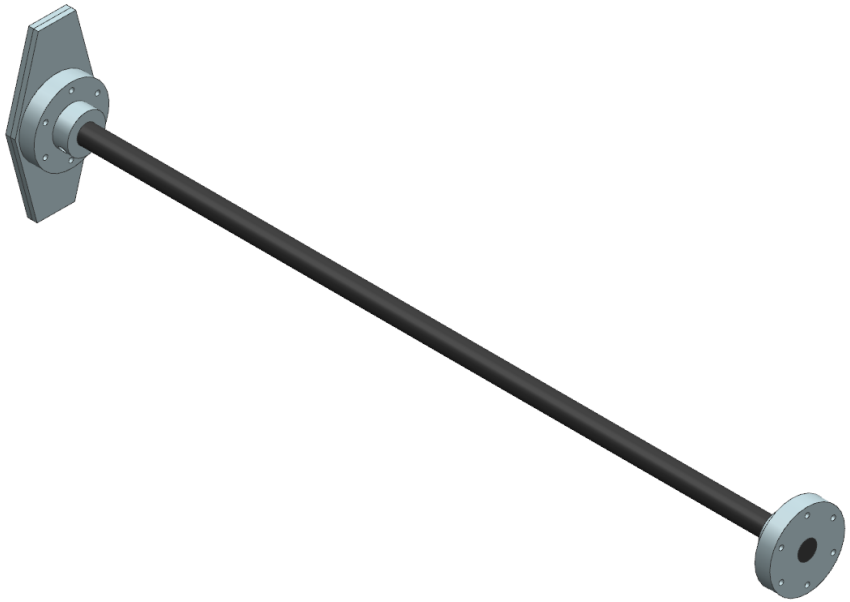
Propellers



- Fiberglass panels
- Fiberglass square tubing
- Foam core
- Stainless steel wheel hub
  - Manufactured in house

Propeller Extension

- The posterior wheel hub directly connects to the wheel hub on the front main propeller to ensure proper alignment.
- The small propeller extends in to the TS collimator region.



Future Work

- Estimate cost of manufacturing
- Finalize the bill of materials
- Perform Finite Element Analyses to test the design
- Finalize the designs and have the drafting department create drawings

Acknowledgements

- Marc Buehler
- Vladimir Kashikhin
- Matt Kramp
- Tom Page
- Cosmore Sylvester
- Mike Tartaglia
- John Tompkins
- George Velev
- Mayling Wong-Squires
- Jerry Zimmerman
- Elliott McCrory
- Dianne Engram
- Linda Diepholz
- Jamieson Olsen

Questions?